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| 09/839,254 | 04/20/2001 | Donald Bennett Hilliard | DBH004 | 1542 |

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| EXAMINER | |
|---|---|
| AL NAZER, LEITH A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2828 | |

DATE MAILED: 03/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/839,254 | Applicant(s) HILLIARD, DONALD BENNETT | |
|---|---|---|---|
| | Examiner Leith A Al-Nazer | Art Unit 2828 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *12 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *22-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 26 and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 26 recites "...the outer layers of the coating include materials for preventing internal reflection." However, the claim fails to provide any specific materials or structures for preventing the internal reflection. Therefore, the claim is vague and indefinite.

Claim 35 recites "...the coating includes additional layers performing additional functions." However, the claim fails to provide any specific structure or functions for the additional layers. The claim is vague and indefinite.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 22, 25-37, 39, and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baer '537 in view of Emmett '259 and Kaliteevski et al.

With respect to claims 22, 27, 37, 44, and 45, Baer teaches a laser apparatus comprising cavity structure means providing a surface of revolution (figure 1), the surface thereby having a circular aspect; a reflective coating deposited on the surface of revolution, the coating providing a circular optical cavity, the optical cavity having a cavity interior with an interior index of refraction, the coating providing greatest reflectance to the radiation at a preferred angle-of-incidence, so that the coating is substantially reflecting to the radiation only at approximately the angle-of-incidence, such that the radiation only contributes to the modes when the radiation is propagating at approximately the preferred angle-of-incidence (column 3, line 66 – column 4, line 30); a gain medium in the cavity interior (column 4, line 44 – column 5, line 5); and pumping means (16) for excitation of the gain medium. Claims 22, 27, 37, and 44 require the coating include at least one hundred thin film dielectric layers, the layers having alternating refractive indices, the alternating refractive indices differing by less than 0.1, and the coating providing greatest reflectance to the radiation at a preferred angle-of-incidence. Emmett teaches such a dielectric structure (figures 1 and 2; Column 6, lines 5-40). Emmett does not explicitly

teach using the multilayer dielectric coating as a mode selection device. However, Kaliteevski teaches a method to calculate the electromagnetic field in a dielectric structure with circular cylindrical symmetry. From the calculations of Kaliteevski, the mode selection properties of a cylindrical multilayer dielectric structure would have been apparent. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the dielectric structure of Emmett as a mode selection device in the circular resonator of Baer, based on the electromagnetic field theory known at the time of the invention, such as the nonpatent literature of Kaliteevski.

With respect to claims 25 and 26, Baer teaches the gain medium being solid state (column 4, line 44 – column 5, line 5).

With respect to claims 28-34, Baer teaches a central coupling structure located centrally in the cavity for coupling energy from the cavity (column 4, lines 20-44).

With respect to claim 35 and 36, Emmett teaches 100 to 100,000 layers that could be adapted for other purposes (column 2, lines 36-39).

With respect to claim 39, Baer teaches the surface of revolution comprising a spherical surface (figure 1).

With respect to claim 43, Baer teaches the angle-of-incidence being approximately normal incidence (column 2, line 66 – column 3, line 15).

6. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baer '537 in view of Emmett '259 and Kaliteevski as applied to claims 22, 25-37, 39, and 43-45 above, and further in view of Smith '882.

Claims 23 and 24 require the gain medium be a gas. Smith teaches a gain medium being a gas. At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize a gaseous gain medium in the system of Baer. The motivation for doing so would have been to obtain a medium which would lase at the desired wavelength.

7. Claim 38 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baer '537 in view of Emmett '259 and Kaliteevski as applied to claims 22, 25-37, 39, and 43-45 above, and further in view of Greene '547.

Claims 38 and 42 require the surface of revolution be discontinuous. Greene teaches a circular resonator with a discontinuous surface (figure 1). At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the discontinuous surface of revolution of Greene in the system taught or suggested by Baer. The motivation for doing so would have been to provide means for input coupling and output coupling the laser light.

With respect to claim 40, Greene teaches the surface of revolution comprising a cylindrical surface (figure 1).

With respect to claim 41, Greene teaches a selected area (14) on the surface of revolution possesses lower reflectivity for coupling energy out of the cavity through the surface of revolution.

***Response to Arguments***

8. Applicant's arguments filed on December 12, 2003 have been fully considered but they are not persuasive.

Applicant argues that "there is no suggestion, description, or implication, in the relied-upon references of Baer and Emmett, that any coating structure, much less structural elements of Emmett, might be used as means for limiting the number of modes in a resonant cavity." Examiner disagrees. Emmett teaches the same structural dielectric layers as claimed by Applicant. One skilled in the art knows how electromagnetic waves will interact with such a dielectric structure, as is evidenced by the cited nonpatent literature to Kaliteevski et al. (Kaliteevski uses a transfer matrix method to calculate the electromagnetic field in a cylindrical multilayer dielectric structure.) Once the behavior/properties of an electromagnetic field in a dielectric structure (such as that of Emmett) are known, it would have been obvious to one having ordinary skill in the art to use such a structure inside of a circular cavity (such as that of Baer) for mode selection.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Communication Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leith A Al-Nazer whose telephone number is 571-272-1938. The examiner can normally be reached on Monday-Friday 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LA

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